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DERWENT-WEEK: 200117

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TITLE: Thermoplastic elastomer compositions useful
for inner
and outer tubes of hoses comprise thermoplastic
copolyester elastomer and acrylic rubber

PATENT-ASSIGNEE: YOKOHAMA RUBBER CO LTD[YOKO]

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JP2000290483A	N/A	1999JP-0099324
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ABSTRACTED-PUB-NO: JP2000290483A

BASIC-ABSTRACT:

NOVELTY - A thermoplastic elastomer composition comprises (i) a thermoplastic resin composition containing at least one thermoplastic copolyester elastomer (30-90 wt%) and (ii) a rubber composition containing an acrylic rubber containing both acryl and epoxy groups (10-70 wt%) with (i) plus (ii) = 100 wt%.

DETAILED DESCRIPTION - A thermoplastic elastomer composition comprises (i) a thermoplastic resin composition containing at least one thermoplastic copolyester elastomer consisting of a high melting point crystalline polymer

hard segment and a low melting point polymer soft segment containing aromatic and/or aliphatic polyester units containing an aliphatic polyether at a mol ratio of polyol residues in the hard segment and polyol residues in the soft segment of 1:1.5-4.0 (30-90 wt%) and (ii) a rubber composition containing an acrylic rubber containing both acryl and epoxy groups (10-70 wt%) with (i) plus (ii) = 100 wt%. An INDEPENDENT CLAIM is also included for hoses consisting of an inner tube, a reinforcing layer and an outer tube and using the thermoplastic elastomer composition in the inner tube and/or outer tube.

USE - The thermoplastic elastomer compositions are useful for inner and outer tubes of hoses.

ADVANTAGE - The hoses using the thermoplastic elastomer composition in the inner and/or outer tubes have excellent oil, cold and heat resistance and improved flexibility without loss of durability and can be manufactured without vulcanization step thus economically.

CHOSEN-DRAWING: Dwg.0/0

TITLE-TERMS: THERMOPLASTIC ELASTOMER COMPOSITION USEFUL INNER OUTER TUBE HOSE

COMPRISE THERMOPLASTIC ELASTOMER ACRYLIC RUBBER

DERWENT-CLASS: A14 A23 A25 A88 P73

CPI-CODES: A04-F06E; A05-A04; A05-E01D; A07-A04D; A12-H02;

ENHANCED-POLYMER-INDEXING:

Polymer Index [1.1]

018 ; H0317 ; S9999 S1661

Polymer Index [1.2]

018 ; ND01 ; ND07 ; N9999 N5970*R ; Q9999 Q7818*R ; Q9999 Q8731 Q8719 ; K9687 K9676 ; K9574 K9483 ; B9999 B4035 B3930 B3838 B3747 ; B9999 B4682 B4568 ; N9999 N6439 ; N9999 N6597 N6586 ; K9892 ; K9449

Polymer Index [1.3]

018 ; G3190 R01541 D00 F80 O* 6A Mg 2A Si 4A ; A999 A237

Polymer Index [1.4]

018 ; R05085 D00 D09 C* 4A ; A999 A419

Polymer Index [1.5]

018 ; R00122 D01 D11 D10 D50 D93 F36 F35 ; A999 A340*R

Polymer Index [2.1]

018 ; D11 D10 D18*R ; R00702 G1343 G1310 G4024 D01 D19 D18 D31
D50

D60 D76 D88 F37 F35 E00 E21 ; R00908 G1036 G1025 G0997 D01 D11
D10

D50 D84 F28 F26 ; R00895 G1592 D01 D23 D22 D31 D42 D50 D75 D84
F34

; P0839*R F41 D01 D63 ; H0011*R ; H0135 H0124 ; S9999 S1661 ;
P0953

P0839 P0964 H0260 F34 F41 D01 D63 ; H0260 ; H0282 ; H0293 ; P0055

Polymer Index [2.2]

018 ; ND01 ; ND07 ; N9999 N5970*R ; Q9999 Q7818*R ; Q9999 Q8731
Q8719 ; K9687 K9676 ; K9574 K9483 ; B9999 B4035 B3930 B3838 B3747
; B9999 B4682 B4568 ; N9999 N6439 ; N9999 N6597 N6586 ; K9892 ;
K9449

Polymer Index [2.3]

018 ; B9999 B3792 B3747 ; B9999 B3827 B3747 ; B9999 B5607 B5572
; B9999 B4795 B4773 B4740

Polymer Index [2.4]

018 ; G3190 R01541 D00 F80 O* 6A Mg 2A Si 4A ; A999 A237

Polymer Index [2.5]

018 ; R05085 D00 D09 C* 4A ; A999 A419

Polymer Index [2.6]

018 ; R00122 D01 D11 D10 D50 D93 F36 F35 ; A999 A340*R

Polymer Index [3.1]

018 ; P0088*R ; H0124*R ; S9999 S1661 ; L9999 L2391 ; L9999 L2073
; M9999 M2073

Polymer Index [3.2]

018 ; ND01 ; ND07 ; N9999 N5970*R ; Q9999 Q7818*R ; Q9999 Q8731
Q8719 ; K9687 K9676 ; K9574 K9483 ; B9999 B4035 B3930 B3838 B3747
; B9999 B4682 B4568 ; N9999 N6439 ; N9999 N6597 N6586 ; K9892 ;
K9449

Polymer Index [3.3]

018 ; D11 D10 D50 D60 D88 F38 F35 ; A999 A157*R

Polymer Index [3.4]

018 ; G3190 R01541 D00 F80 O* 6A Mg 2A Si 4A ; A999 A237

Polymer Index [3.5]

018 ; R05085 D00 D09 C* 4A ; A999 A419

Polymer Index [3.6]

018 ; R00122 D01 D11 D10 D50 D93 F36 F35 ; A999 A340*R

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CPI Secondary Accession Numbers: C2001-015563

Non-CPI Secondary Accession Numbers: N2001-041420

* NOTICES *

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- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] When it consists of the thermoplastics constituent which contains a thermoplastic copoly ester elastomer in more detail, and the rubber constituent containing specific acrylic rubber about the hose which used a thermoplastic-elastomer constituent and it and is used as the inner tube and/or outer tube of a hose, this invention can be manufactured without excelling in oilproof, cold resistance, and thermal resistance and needing a vulcanization process, and it relates to the hose using the thermoplastic-elastomer constituent and it which improved flexibility, without dropping endurance.

[0002]

[Description of the Prior Art] Although a rubber hose usually consists of an inner tube, a reinforcement layer, and an outer tube and an inner tube and an outer tube consist of vulcanized rubber, since the vulcanization process is required, such a rubber hose has the problem that a production process will become complicated. The so-called resin hose with a simple production process is also known for the point which, on the other hand, does not need the vulcanization process which constituted the inner tube and the outer tube from thermoplastics. However, generally the thermoplastics which constitutes this resin hose was hard as compared with vulcanized rubber, while it was difficult to obtain a flexible hose, thermoplastics had softening temperature and the activity at 120 degrees C or more was also usually difficult for it.

[0003] Moreover, although the resin hose constituted from thermoplastic elastomer of the polyester system used as a soft segment is also known [polybutylene terephthalate / caprolactone / the hard segment the polytetramethylene glycol, or / poly] in the inner tube in order to improve the flexibility of thermoplastics, the thermoplastic elastomer of this polyester system has a limitation in forming a low degree of hardness, in order to acquire a required heat-resistant softening degree and a required strength property, and has come to obtain the hose which has sufficient flexibility and thermal resistance like vulcanized rubber.

[0004] Therefore, manufacture at the simple process which does not require a vulcanization process was possible, and the hose, pressure transfer in an elevated temperature, a fluid transfer which have sufficient flexibility were expected development of the hose which also has available thermal resistance. The hose which has the inner tube which consisted of thermoplastic elastomer which distributed vulcanized rubber in thermoplastics, and an outer tube is proposed to such a demand (refer to Japanese-Patent-Application-No. No. 64102 [six to] official report).

[0005] This hose constitutes the outer tube from thermoplastic elastomer which constituted the inner tube from thermoplastic elastomer which the vulcanization constituent of acrylic radical content rubber distributed in polyester system thermoplastics, and vulcanized rubber distributed in thermoplastics. Furthermore, it is made to paste up with an inner tube and an outer tube through room-temperature-setting mold urethane system adhesives etc., and the reinforcement layer constitutes organic fiber or inorganic ****, such as a rayon fiber, polyester fiber, or *****. However, the flexibility and cold

resistance in low temperature-dependency-characteristics nature, especially low temperature cannot necessarily be satisfied with this hose practically, and the further oilproof improvement was also required.

[0006] Therefore, by JP,9-272788,A, the thermoplastic-elastomer constituent containing the acrylic rubber containing a thermoplastic copoly ester elastomer, an acrylic radical, and an epoxy group is proposed for the purpose of improving further the flexibility in low temperature, oilproof, and cold resistance of a hose.

[0007]

[Problem(s) to be Solved by the Invention] Although the flexibility in low temperature, oilproof, and cold resistance could obtain the good hose by the above configurations, in this hose, it could not say that flexibility and endurance were enough, but those improvements were still more nearly required.

[0008] Therefore, the object of this invention is to offer the hose which has said property which used the thermoplastic-elastomer constituent and it which can improve the flexibility and endurance of a hose for the inner tube and/or the outer tube, when it is used for the inner tube and/or outer tube of a hose.

[0009]

[Means for Solving the Problem] If this invention is followed (i) at least a kind of thermoplastic copoly ester elastomer 10 - 70 % of the weight (however, a component (i) and 100 % of the weight of total quantities of (ii)) of rubber constituents containing the acrylic rubber containing 30 - 90 % of the weight of thermoplastics constituents, (ii) acrylic radical, and the epoxy group which are included is included. The high-melting crystalline-polymer hard segment in which said thermoplastic copoly ester elastomer (i) contains crystalline aromatic polyester, While making the low-melt point point polymer soft segment containing the aromatic series and/or the aliphatic series polyester unit containing an aliphatic series polyether into a main constituent The hose which used for the inner tube and/or the outer tube the thermoplastic-elastomer constituent and it to which the mole ratio of the polyol residue of said hard segment and the polyol residue of said soft segment is characterized by or more 1:1.5 being less than 4.0 is offered. Thus, flexibility can be raised more by using a specific thermoplastic copoly ester elastomer, maintaining the endurance of a hose.

[0010]

[Embodiment of the Invention] A part of thermoplastics constituent containing the thermoplastic copoly ester elastomer of sufficient amount to give thermoplasticity and sufficient amount [at least] to give rubber-like elasticity serve as a thermoplastic-elastomer constituent which constitutes the inner tube and outer tube of a hose of this invention from the blend with the vulcanized acrylic rubber **** rubber constituent, and a thermoplastic copoly ester elastomer component says that in which the acrylic rubber to which at least the part vulcanized the continuous phase (matrix phase) as a discontinuous phase (dispersed phase) nothing and in it exists. In addition, you may be the so-called salami structure which thermoplastics distributed further in this discontinuous phase (rubber phase).

[0011] The thermoplastic copoly ester elastomers which are the first component of the thermoplastic-elastomer constituent of this invention are plural block copolymers which make polyester and a polyether a main repeating unit, and while making the high-melting crystalline-polymer hard segment containing crystalline aromatic polyester, and the low-melt point point polymer soft segment containing the aromatic series and/or the aliphatic series polyester unit containing an aliphatic series polyether into a main constituent, the mole ratio of the polyol residue of said hard segment and the polyol residue of said soft segment is less than [1:1.5 or more] 4.0.

[0012] The high-melting crystalline-polymer hard segment containing the crystalline aromatic polyester of a thermoplastic copoly ester elastomer (i) used for this invention is polyester formed mainly from aromatic series dicarboxylic acid or its ester plasticity derivative, and diol or its ester plasticity derivative.

[0013] As aromatic series dicarboxylic acid, a terephthalic acid, isophthalic acid, a phthalic acid, naphthalene -2, 6-dicarboxylic acid, naphthalene -2, 7-dicarboxylic acid, anthracene dicarboxylic acid, diphenyl -4, - dicarboxylic acid, difenoxycarboxylic acid, and 4 '4, 4'-diphenyl ether dicarboxylic acid, 5-sulfoisophtharate, 3-sulfoisophtharate sodium, etc. are mentioned. Although aromatic series dicarboxylic

acid is mainly used, depending on the need, some aromatic series dicarboxylic acid may be permuted by aliphatic series dicarboxylic acid, such as alicycle group dicarboxylic acid, such as 1, 4-cyclohexane dicarboxylic acid, cyclopentane dicarboxylic acid, 4, and 4'-dicyclohexyl dicarboxylic acid, an adipic acid, a succinic acid, oxalic acid, a sebacic acid, a dodecane dione acid, and dimer acid. Of course, the ester plasticity derivative of dicarboxylic acid, for example, low-grade alkyl ester, aryl ester, a carbonate, acid halide, etc. can be used equally.

[0014] As diol, with a molecular weight of 400 or less diol, for example, 1,4-butanediol, Ethylene glycol, a trimethylene glycol, pentamethylene glycol, Aliphatic series diols, such as hexamethylene glycol, neopentyl glycol, and a deca methylene glycol, 1 and 1-cyclohexane dimethanol, 1, 4-JISHIKURO hexane dimethanol, Alicycle group diols, such as tricyclodecane dimethanol, a xylylene glycol, Bis(p-hydroxy) diphenyl, a bis(p-hydroxyphenyl) propane, A 2 and 2-bis[4-(2-hydroxy ethoxy) phenyl] propane, A bis[4-(2-hydroxy) phenyl] sulfone, 1, and 1-bis[4-(2-hydroxy ethoxy) phenyl] cyclohexane, Aromatic series diols, such as - dihydroxy-p-terphenyl, and 4 and 4' 4, 4'-dihydroxy-p-quarter phenyl, are desirable, and can also use this diol also in forms, such as an ester plasticity derivative, for example, an acetyl object, and an alkali-metal salt.

[0015] These dicarboxylic acid and the derivative of those, or two or more sorts of diol components may be used together. And the examples of the most desirable high-melting crystalline-polymer segment (a) are a terephthalic acid and/or dimethyl terephthalate, and polybutylene terephthalate guided from 1,4-butanediol.

[0016] The low-melt point point polymer soft segment which constitutes the thermoplastic copoly ester elastomer (i) of this invention contains the aromatic series and/or the aliphatic series polyester unit containing an aliphatic series polyether.

[0017] As an aliphatic series polyether, the copolymer of the Pori (ethylene oxide) glycol, the Pori (propylene oxide) glycol, the Pori (tetramethylene oxide) glycol, the Pori (hexamethylene oxide) glycol, ethylene oxide, and propylene oxide, the ethylene oxide addition polymer of the Pori (propylene oxide) glycol, the copolymer of ethylene oxide and a tetrahydrofuran, etc. are mentioned. Flexibility can be raised without being able to make rubber elasticity give a thermoplastic copoly ester elastomer, and spoiling the mechanical physical properties of a thermoplastic-elastomer constituent by making such an aliphatic series polyether contain.

[0018] Moreover, the thing same as aromatic polyester as the crystalline aromatic polyester of the high-melting crystalline-polymer hard segment mentioned above etc. is mentioned.

[0019] Moreover, as aliphatic series polyester, Pori (epsilon-caprolactone), poly ENANTO lactone, poly KAPURIRO lactone, a polybutylene horse mackerel peat, etc. are mentioned.

[0020] The ethylene oxide addition product of the Pori (tetramethylene oxide) glycol from the elasticity of the polyester block copolymer obtained while containing the aromatic series and/or the aliphatic series polyester unit containing these aliphatic series polyethers, and the Pori (propylene oxide) glycol, Pori (epsilon-caprolactone), a polybutylene horse mackerel peat, etc. are desirable.

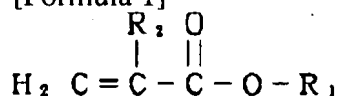
[0021] The amount of copolymerization of the low-melt point point polymer soft segment in the thermoplastic copoly ester elastomer (i) used for this invention is 1:1.6-1.8 preferably less than [1:1.5 or more] 4.0 as a mole ratio of the polyol residue of a hard segment, and the polyol residue of said soft segment. If a soft segment ratio is smaller than 1:1.5, the amelioration effectiveness of flexibility will not show up, but physical properties, such as a mechanical strength, will fall that it is 1:4.0 or more, and the endurance of a hose etc. will get worse.

[0022] moreover, (i) -- although thermoplastics other than a thermoplastic copoly ester elastomer can be suitably blended with the thermoplastics constituent which contains a kind of thermoplastic copoly ester elastomer at least, it is good to include a thermoplastic copoly ester elastomer 50% of the weight or more preferably.
 [0023] The acrylic rubber used as a rubber component of the thermoplastic-elastomer constituent of this invention can fry the copolymer rubber which is rubber of cross-linking which has an acrylic radical and an epoxy group as a side chain as a principal chain, for example, contains epoxy group content acrylate and/or methacrylate as a copolymerization component in a molecule. The epoxy group content (meta) acrylate copolymer rubber used by this epoxy group content

(meta) acrylate copolymer or this invention is (1) (meta) acrylic-acid alkyl ester and/or (meta) acrylic-acid alkoxy permutation alkyl ester, (2) epoxy-group content monomer, and plural copolymers rubber that comes to carry out the polymerization of other copolymerizable ethylenic unsaturated monomers to (3) these (1) and (2) if needed.

[0024] The acrylic-acid alkyl ester (1) used for manufacture of epoxy group content (meta) acrylate copolymer rubber (meta) is following formula: [0025].

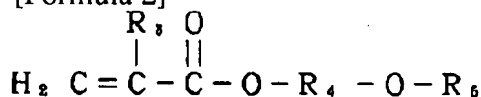
[Formula 1]



It is expressed with (R1 is the alkyl group of carbon numbers 1-18 among a formula, and R2 shows hydrogen or a methyl group). As an example of this (meta) acrylic-acid alkyl ester Methyl (meta) acrylate, ethyl (meta) acrylate, n-propyl (meta) acrylate, n-butyl (meta) acrylate, isobutyl (meta) acrylate, n-pentyl (meta) acrylate, isoamyl (meta) acrylate, n-hexyl (meta) acrylate, 2-methyl pentyl (meta) acrylate, n-octyl (meta) acrylate, 2-ethylhexyl (meta) acrylate, n-DESHIRU (meta) acrylate, n-dodecyl (meta) acrylate, n-octadecyl (meta) acrylate etc. is mentioned. Especially Ethyl (meta) acrylate, n-propyl (meta) acrylate, n-butyl (meta) acrylate, n-pentyl (meta) acrylate, n-hexyl (meta) acrylate, 2-ethylhexyl (meta) acrylate, and n-octyl (meta) acrylate are desirable. R1 can raise low temperature-dependency-characteristics nature further still more preferably by using the acrylic rubber in which said acrylic rubber contains the alkyl ester parts of C3-C18 25% of the weight or more.

[0026] Moreover, acrylic-acid (meta) alkoxy permutation alkyl ester (1) is following formula: [0027].

[Formula 2]

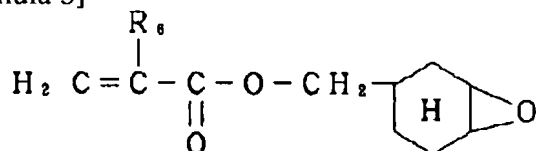


It is expressed with (among a formula, in R3, hydrogen or a methyl group, and R4 show the alkylene group of carbon numbers 1-18, and R5 shows the alkyl group of carbon numbers 1-18). As an example of this (meta) acrylic-acid alkyl ester 2-methoxy ethyl (meta) acrylate, 2-ethoxyethyl (meta) acrylate, 2-(n-propoxy) ethyl (meta) acrylate, 2-(n-butoxy) ethyl (meta) acrylate, 3-methoxy propyl (meta) acrylate, 3-ethoxy propyl (meta) acrylate, 2-(n-propoxy) propyl (meta) acrylate, 2-(n-butoxy) propyl (meta) acrylate, etc. are mentioned.

[0028] As an epoxy group content monomer used for manufacture of epoxy group content (meta) acrylate copolymer rubber, allyl glycidyl ether, glycidyl methacrylate, glycidyl acrylate, the compound shown in the following are mentioned (in following each formula, R6 in a formula expresses hydrogen or a methyl group).

[0029]

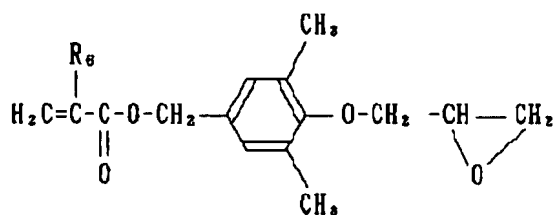
[Formula 3]



3, 4-エポキシヘキサヒドロベンジル(メタ)アクリレート

[0030]

[Formula 4]



[0031]

[illegible]

[0032]

$$\begin{array}{c} \text{R}_e \\ | \\ \text{H}_2\text{C}=\text{C}-\text{C}-\text{O}-\text{CH}_2\text{CH}_2-\text{O}-\text{C}-\text{CH}_2\text{CH}_2-\text{C}-\text{O}-\text{CH}_2-\text{CH}-\text{CH}_2 \\ || \quad \quad \quad || \quad \quad \quad || \\ \text{O} \quad \quad \quad \text{O} \quad \quad \quad \text{O} \end{array}$$

[0033]

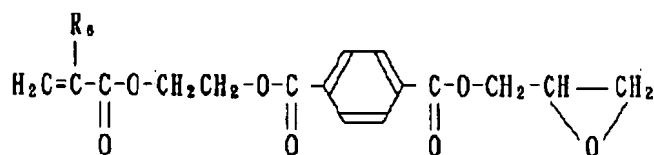
$$\text{H}_2\text{C}=\overset{\text{R}_0}{\underset{\text{O}}{\text{C}}}-\text{O}-\text{CH}_2\text{CH}_2-\text{O}-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{C}_6\text{H}_4-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{O}-\text{CH}_2-\underset{\text{O}}{\text{CH}}-\text{CH}_2$$

[0034]

$$\begin{array}{c} \text{R}_6 \\ | \\ \text{H}_2\text{C}=\text{C}-\text{O}-\text{CH}_2\text{CH}_2-\text{O}-\text{C} \begin{array}{c} \text{O} \\ || \\ \text{O} \end{array} \text{---} \text{C} \begin{array}{c} \text{O} \\ || \\ \text{O} \end{array} \text{---} \text{CH}_2-\text{CH} \begin{array}{c} \text{O} \\ \diagup \quad \diagdown \end{array} \text{CH}_2 \end{array}$$

[0035]

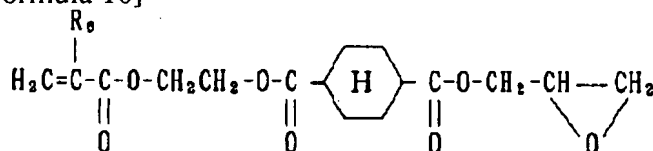
[Formula 9]



2 - (メタ) アクリロイルオキシエチルテレフタル酸グリシジルエステル

[0036]

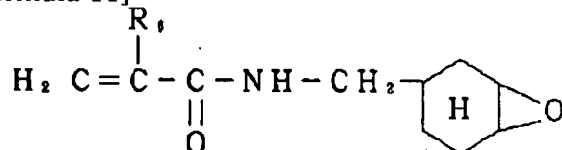
[Formula 10]



2 - (メタ) アクリロイルオキシエチルヘキサヒドロテレフタル酸グリシジルエステル

[0037]

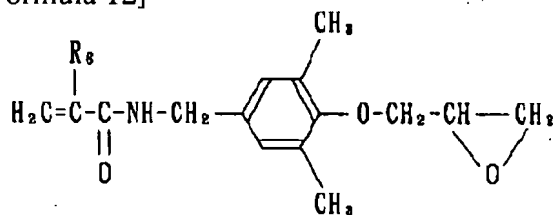
[Formula 11]



3. 4 - エポキシヘキサヒドロベンジル (メタ) アクリルアミド

[0038]

[Formula 12]



4 - グリシジルオキシ - 3, 5 - ジメチルベンジル (メタ) アクリルアミド

[0039] As acrylic-acid (meta) alkyl ester or (meta) acrylic-acid alkoxy permutation alkyl ester (1) and an epoxy group content monomer, and a monomer made to copolymerize, if needed 2-cyano ethyl (meta) acrylate, 3-cyano propyl (meta) acrylate, Cyano permutation alkyl (meta) acrylate, such as 4-cyano butyl (meta) acrylate, Amino permutation alkyl (meta) acrylate like diethylaminoethyl (meta) acrylate, Fluorine-containing (meta) acrylate like 1, 1, and 1-trifluoroethyl (meta) acrylate, Hydroxylation alkyl (meta) acrylate like hydroxyethyl (meta) acrylate, An alkyl vinyl ketone like a methyl vinyl ketone, vinyl ethyl ether, Vinyl, such as allyl compound methyl ether, or the allyl compound ether, styrene, Vinyl aromatic compounds, such as alpha methyl styrene, chloro styrene, and vinyltoluene, Vinyl amides, such as vinyl nitril, such as acrylonitrile and meta-acrylonitrile, acrylamide, meta-acrylamide, and N-methylol acrylamide, and ethylene, a propylene, vinyl acetate, etc. are mentioned. The acrylic rubber used by this invention is acrylic rubber which an acrylic acid and an alkyl component become from the alkyl ester of C3-C18 preferably, for example, contains butyl acrylate, propylacrylate, dodecylacrylate, and hexadecyl acrylate 30 to 60% of the weight still more preferably 25% of the weight

or more.

[0040] As a concrete component configuration of the rubber (acrylic rubber) containing an acrylic radical and an epoxy group, from a heat-resistant point As alkyl (meta) acrylate or alkoxy alkyl (meta) acrylate (1) The copolymerization rubber which constituted from an ethyl acrylate independent and was constituted from glycidyl methacrylate as an epoxy group content monomer from a cold-resistant point As alkyl (meta) acrylate or alkoxy alkyl (meta) acrylate (1) It constitutes from ethyl acrylate, butyl acrylate, and methoxy ethyl acrylate, and the copolymerization rubber constituted from glycidyl methacrylate is suitably illustrated as an epoxy group content monomer. Furthermore, in heat-resistant and cold-resistant balance, it is good to select the class and amount of alkyl (meta) acrylate or alkoxy alkyl (meta) acrylate (1). Moreover, in bridge formation of copolymerization rubber, an epoxy group is used for crosslinking reaction and an epoxy group content monomer component is usually preferably used suitably in the vulcanization reactivity performed dynamically still more preferably 1.5 to 15% of the weight one to 20% of the weight during kneading which what is contained two to 10% of the weight mentions later.

[0041] the thermoplastic-elastomer constituent (i) with which the thermoplastic-elastomer constituent of this invention contains a thermoplastic copoly ester elastomer, and the rubber constituent (ii) containing acrylic rubber -- (Component i):component (ii) = -- 30 - 90 % of the weight : 70 - 10 % of the weight (a total of 100 % of the weight) -- desirable -- (Component i):component (ii) = -- it blends at 30 - 80 % of the weight : 70 - 20 % of the weight. Since a rubber phase turns into a matrix phase and the fluidities at the time of extruding etc. are spoiled while a mechanical strength will fall if too conversely few preferably since flexibility will be spoiled if there are too many loadings of a component (i), it is not desirable.

[0042] The cross linking agent compound or organic peroxide which it has two or more pieces at intramolecular by making either [at least] a carboxyl group or a carboxylic anhydride radical into a carboxyl group can be mentioned to the thermoplastic-elastomer constituent of this invention. As an example of a type of this cross linking agent compound, the following compounds can be raised, for example.

[0043] The cross linking agent of this invention is not exceptionally restricted, as long as it is the compound which has two or more carboxyl groups and/or one or more carboxylic anhydride radicals in a molecule. Preferably, aliphatic series, alicyclic and the polycarboxylic acid of aromatic series, its (part) carboxylic anhydride, and the esterification (part) object of these compounds and alkylene glycol (Pori) are used. As a cross linking agent, a with a molecular weight of 5,000 or less thing is desirable.

[0044] As an example of aliphatic series polycarboxylic acid, a succinic acid, a glutaric acid, a pimelic acid, an azelaic acid, a sebacic acid, dodecane dicarboxylic acid, OKUTA decane dicarboxylic acid, a dodecenyl succinic acid, and butane tetracarboxylic acid are mentioned. As an example of alicyclic polycarboxylic acid, cyclopentane dicarboxylic acid, cyclopentane tricarboxylic acid, cyclopentane tetracarboxylic acid, cyclohexane dicarboxylic acid, cyclohexane tricarboxylic acid, methylcyclohexane dicarboxylic acid, a tetrahydrophthal acid and a methylene tetrahydrophthal acid, methyl, and a methylene tetrahydrophthal acid are mentioned. As an example of aromatic polycarboxylic acids, a phthalic acid, isophthalic acid, a terephthalic acid, trimellitic acid, trimesic acid, and pyromellitic acid are mentioned. (Part) As an example of a carboxylic anhydride, the carboxylic anhydride (part) of these polycarboxylic acid is mentioned.

[0045] per [in which the desirable loadings of said cross linking agent compound contain acrylic rubber / 0.5] rubber constituent 100 weight section - 20 weight sections -- it is 1 - 15 weight section still more preferably. While a bridge is constructed over an acrylic rubber dispersed phase and a mechanical strength improves by blending this cross linking agent compound, since set-proof nature improves, it is desirable.

[0046] moreover, the compounding agent added by the usual constituents, such as a reinforcing agent, a bulking agent, a softener, an antioxidant, and processing aid, in the range which does not spoil the object of this invention to an aforementioned elastomer constituent or an aforementioned thermoplastics constituent for improvements, such as the fluidity of a thermoplastic-elastomer constituent, thermal

resistance, physical reinforcement, and cost, -- initial-complement ***** -- things are also made.

[0047] When the chemical compatibility of the above mentioned specific thermoplastics and the above mentioned rubber constituent differs, it is desirable to make both compatibility-ize using a compatibilizer suitable as the 3rd component. By mixing a compatibilizer in a system, since the rubber constituent particle diameter which the boundary tension of thermoplastics and a rubber constituent declines, consequently forms the dispersion layer becomes detailed, the property of both components will be discovered more by validity. The structure of a copolymer with the epoxy group in which the copolymer which generally has the structure of both a thermoplastics component, a rubber component, or one of the two as such a compatibilizer, a thermoplastics component or a rubber component, and a reaction are possible, a carboxyl group, a carbonyl group, a halogen radical, the amino group, an oxazoline radical, a hydroxyl group, etc. shall be taken. Although what is necessary is just to select these according to the class of the thermoplastics component mixed and rubber component, a styrene ethylene butylene styrene system block copolymer (SEBS) and its maleic-acid denaturation object, EPDM, EPM (s) and those maleic-acid denaturation objects, EPDM/styrene or EPDM / acrylonitrile graft copolymer and its maleic-acid denaturation object, styrene / maleic-acid copolymer, a maleic acid or an epoxy denaturation ethylene-vinylacetate copolymer, ethylene ethyl acrylate, reactant FENOKISHIN, etc. can be mentioned to what is usually used. Although there is especially no definition in the loadings of this compatibilizer, 0.5 - 20 weight section is preferably good to the polymer component (total of thermoplastics and rubber) 100 weight section.

[0048] There is especially no definition that what is necessary is just to determine suitably the vulcanizing agent and vulcanization assistant which are used for vulcanization of the rubber constituent used for the thermoplastic-elastomer constituent used for this invention, vulcanization conditions (temperature, time amount), etc. according to the presentation of the rubber constituent to add. As a vulcanizing agent, a general rubber vulcanizing agent (cross linking agent) can be used. What is necessary is to illustrate powder sulfur, sedimentation nature sulfur, high dispersibility sulfur, surface-preparation sulfur, insoluble sulfur, JIMORUFO phosphorus disulfide, alkylphenol disulfide, etc. as a sulfur system vulcanizing agent, for example, just to specifically use 0.5 - 4phr (weight section per elastomer component (polymer) 100 weight section) extent.

[0049] Moreover, what is necessary is to illustrate benzoyl peroxide, t-butyl hydroperoxide, 2,4-dichlorobenzyl peroxide, 2, the 5-dimethyl -2, 5-di-tert-butyl peroxide hexane, 2,5-dimethylhexane-2,5-di(peroxyl benzoate), etc., for example, just to use 1 - 15phr extent as a vulcanizing agent of an organic peroxide system. Furthermore, what is necessary is to illustrate the mixed bridge formation system containing a halogen donor and alkylphenol resin, such as a bromination object of alkylphenol resin, and tin chloride, a chloroprene, etc. as a vulcanizing agent of a phenol resin system, for example, just to use 1 - 20phr extent.

[0050] As others, a zinc white (5phr extent), magnesium oxide (4phr extent), a litharge (10 - 20phr extent), p-quinonedioxime, p-dibenzoyl quinonedioxime, tetra-chloro-para benzoquinone, Polly p-dinitroso benzene (2 - 10phr extent), and MECHIRIN dianiline (0.2 - 10phr extent) are illustrated.

[0051] Moreover, a vulcanization accelerator may be added if needed. What is necessary is just to use about 0.5-2 phrs of general vulcanization accelerators, such as an aldehyde ammonia system, a guanidine system, a thiazole system, a sulfenamide system, a thiuram system, a dithioic acid salt system, and a thiourea system, as a vulcanization accelerator, for example.

[0052] Specifically as an aldehyde ammonia system vulcanization accelerator A hexamethylenetetramine etc. as a; guanidine system vulcanization accelerator Diphenylguanidine etc. as a; thiazole system vulcanization accelerator Dibenzothiazyl disulfide (DM), 2-mercaptobenzothiazole and its Zn salt, a cyclohexylamine salt, etc. as a; sulfenamide system vulcanization accelerator Cyclohexylbenzothiazyl sulfene AMAIDO (CBS), N-oxydi ethylene benzothiazyl-2-sulfene AMAIDO, N-t-butyl-2-benzothiazole sulfene AMAIDO, 2-(anemarrhena rhizome RUPORI nil dithio) benzothiazole, etc. as a; thiuram system vulcanization accelerator Tetramethyl thiuram disulfide (TMTD), tetraethylthiuram disulfide, Tetramethylthiuram monosulfide (TMTM), JIPENTAMECHIREN thiuram tetra-sulfide, etc. as a; dithioic acid salt system vulcanization accelerator Zn-dimethyl

dithiocarbamate, Zn-diethyl dithiocarbamate, Zn-di-n-butyl dithiocarbamate, Zn-ethyl phenyl dithiocarbamate, Tc-diethyl dithiocarbamate, Cu-dimethyl dithiocarbamate, Fe-dimethyl dithiocarbamate, pipercolic PIPEKORIRU dithiocarbamate, etc. -- as; thiourea system vulcanization accelerator -- ethylene thiourea, diethyl thiourea, etc. --; -- it is indicated, respectively.

[0053] Moreover, what is necessary is to be able to use the general assistant for rubber collectively as a vulcanization accelerator, for example, just to use a zinc white (5phr extent), stearic acid, oleic acid, these Zn salts (2 - 4phr extent), etc.

[0054] Moreover, although rubber other than the acrylic rubber containing an acrylic radical and an epoxy group can be suitably blended with the rubber constituent containing the acrylic rubber containing (ii) acrylic radical and an epoxy group, it is good to include the acrylic rubber which contains an acrylic radical and an epoxy group preferably 50% of the weight or more.

[0055] The manufacture approach of the thermoplastic-elastomer constituent used for this invention carries out melting kneading of the rubber constituent containing the acrylic rubber containing the thermoplastics component, acrylic radical, and epoxy group which contain a thermoplastic copoly ester elastomer beforehand with a biaxial kneading extruder etc., and is because a rubber constituent is distributed as a dispersed phase (domain) in the thermoplastics which forms a continuous phase (matrix phase). Next, in order to vulcanize a rubber constituent, a vulcanizing agent is added under kneading and a rubber constituent is made to vulcanize dynamically. Moreover, although you may add during the above-mentioned kneading, as for the various compounding agents to thermoplastics or a rubber constituent, mixing beforehand before kneading is desirable. Under the present circumstances, the vulcanizing agent is also beforehand mixed in the rubber constituent, and while kneading thermoplastics and a rubber constituent, it can also vulcanize simultaneously. As a kneading machine used for kneading of thermoplastics and a rubber constituent, there is especially no definition and it can use a screw extruder, a kneader, the Banbury mixer, a biaxial kneading extruder, etc. It is desirable to use a biaxial kneading extruder for kneading of thermoplastics and a rubber constituent and dynamic vulcanization of a rubber constituent especially. Furthermore, two or more kinds of kneading machines may be used, and sequential kneading may be carried out.

[0056] Processing which this thermoplastic-elastomer constituent showed the same behavior as vulcanized rubber since the vulcanized-rubber phase from which at least a part serves as a discontinuous phase at the thermoplastics phase from which at least a part serves as a continuous phase will be in the condition of having distributed minutely, and applied to thermoplastics correspondingly on the occasion of that fabricating operation since a continuous phase was a thermoplastics phase at least is possible for the thermoplastic-elastomer constituent obtained by using such a process.

[0057] Such a thermoplastic-elastomer constituent constitutes some of continuous phases and rubber constituents [at least] as a discontinuous phase for some thermoplastics [at least], it is desirable that the particle diameter of the vulcanized-rubber constituent which is a discontinuous phase is 50 micrometers or less, and it is more more desirable still that it is 0.1-10 micrometers.

[0058] In addition, especially definition is not carried out that what is necessary is just to determine suitably kneading conditions, the class of vulcanizing agent to be used, an amount, vulcanization conditions (temperature etc.), etc. according to combination of the rubber constituent to add, and the loadings of a rubber constituent.

[0059] The manufacture approach of the thermoplastic-elastomer constituent of such this invention is shown below. First, resin and a rubber constituent are added, melting kneading is carried out, and subsequently, manufacture of the thermoplastic-elastomer constituent of this invention can add a vulcanizing agent under kneading, and can be performed by making rubber vulcanize dynamically.

[0060] Moreover, to the constituent of this invention, compounding agents, such as a reinforcing agent, a softener, and an antioxidant, may be added if needed. Although the compounding agent to a rubber constituent may be added during the above-mentioned kneading, compounding agents other than a vulcanizing agent are good before the above-mentioned kneading to mix beforehand. You may mix beforehand before the above-mentioned kneading, and the compounding agent to a resin constituent may be added during the above-mentioned kneading.

[0061] Although there is especially no definition, a screw extruder, a kneader, the Banbury mixer, a biaxial kneading extruder, etc. are mentioned to the kneading machine used for manufacture of the thermoplastic-elastomer constituent of this invention. When kneading of a resinous principle and a rubber component and dynamic vulcanization of a rubber component are taken into consideration especially, it is desirable to use a biaxial kneading extruder. Furthermore, two or more kinds of kneading machines may be used, and sequential kneading may be carried out.

[0062] Although it is desirable as conditions for melting kneading that 90-350 degrees C is 180-300 degrees C, for example as for especially kneading temperature, especially definition will not be carried out if it is beyond the temperature that a thermoplastic copoly ester elastomer component fuses. If vulcanizing time becomes late and kneading temperature exceeds 350 degrees C conversely at less than 90 degrees C, the physical properties of a thermoplastic-elastomer constituent will fall by decomposition of a polymer. As for the shear rate at the time of kneading, it is desirable especially 500-8000sec⁻¹ and that it is 500-5000sec⁻¹. As for the residence time (vulcanizing time) after the residence time of the whole melting kneading adds a vulcanizing agent for 30 seconds to 10 minutes, it is desirable that it is 15 seconds - 5 minutes. A shear rate is calculated by the periphery of the circle which the head of a screw draws by ωr on it the product which applies the rotational frequency for 1 second of a screw, and is obtained in the gap at a head. That is, a shear rate is the value which broke the rate at a head by the gap at a head. Here, with the residence time in the part which performs dynamic vulcanization, the complete product of a part which performs dynamic vulcanization is multiplied by the fullness multiplier, and it is ωt and calculated by the volume rate of flow.

[0063] In addition, when manufacturing a thermoplastic-elastomer constituent in this process, the relation to mutual has the relation of a volume fraction to the viscosity at the time of melting kneading of the thermoplastics constituent to be used and an acrylic rubber constituent, and considering as the relation of the following formula is desirable the temperature of 90 degrees C - 350 degrees C, and in shear rate 500-8000sec⁻¹ at the time of the usual kneading.

It is here. $0.25 \leq \phi_1 \leq 0.90$ -- desirable -- $0.30 \leq \phi_1 \leq 0.80$ $0.10 \leq \phi_2 \leq 0.75$ -- desirable -- $0.20 \leq \phi_2 \leq 0.70$ $\phi_1 + \phi_2 = 1.0$ $\eta_2 / \eta_1 < 4.0$ -- desirable -- $< 3.7 (\eta_1 / \eta_2) (\phi_2 / \phi_1) < 1.0$ --
 η_1 : Viscosity η_2 at the time of melting kneading of a thermoplastics constituent : Viscosity ϕ_1 at the time of melting kneading of a rubber constituent : Volume fraction ϕ_2 of a thermoplastics constituent : Kneading nature is stable by kneading within the limits of the volume fraction above-mentioned type of a rubber constituent. A rubber ratio is controlled widely, implementation of the formation of a high rubber ratio is preferably possible, and it is flexible, and the thermoplastic-elastomer constituent which is high elongation after fracture can be obtained.

[0064] In addition, melt viscosity means the temperature of the arbitration at the time of kneading processing, and the melt viscosity of a component, and since the melt viscosity of each polymer ingredient has the dependency of temperature, a shear rate (sec⁻¹), and shearing stress, it measures the temperature of the arbitration in the melting condition of generally flowing the inside of a capillary, especially the stress and the shear rate of a polymer ingredient in the temperature field at the time of kneading, and measures melt viscosity from a bottom type (1) here.

[0065]

[Equation 1]

$$\eta = \sigma / \dot{\gamma} \quad \dots (1)$$

(式中、 σ : 剪断応力、 $\dot{\gamma}$: 剪断速度)

In addition, capillary tube rheometer KYAPIRO graph by Oriental energy machine company 1C was used for measurement of melt viscosity.

[0066] In order to manufacture the hose according to this invention, use said thermoplastic elastomer by well-known extrusion molding, manufacture the inner tube of the hose of this invention, and adhesives are applied to the outside surface if needed. Or after extruding adhesive thermoplastics, on it, twist reinforcement fiber or reinforcement steel wire a blade or in the shape of a spiral, and adhesives are applied further if needed. Or adhesive thermoplastics can be extruded and it can be based on the general

approach of covering an outer tube with thermoplastic-elastomer extrusion molding again. The thermoplastic-elastomer constituent which made the thermoplastics constituent of an inner tube and/or an outer tube which contains said thermoplastic copoly ester elastomer to constitute in either at least distribute the vulcanizate of an acrylic rubber constituent is used in that case.

[0067] When using adhesives suitable as a glue line between the reinforcement layers which consist of an inner tube, fiber, or steel wire, and between a reinforcement layer and an outer tube in manufacturing the hose concerning this invention, the urethane system adhesives currently generally used as an object for hose from the former as adhesives can also be used. Moreover, when using adhesive thermoplastics, polyester system copolymerization resin etc. can be used. In addition, in any case, especially definition is not in the thickness of a glue line, but it is 10-500 micrometers preferably, respectively.

[0068] Next, although it is possible to use metal reinforcement layers, such as organic fiber, such as aromatic polyamide fiber, such as nylon fiber currently used as an object for hose from the former, Vinylon fiber, a rayon fiber, polyester fiber, and an aramid fiber, and a hard drawn steel wire, brass plating steel wire, bronze plating steel wire, and a galvanized steel wire, as a reinforcement layer of the hose concerning this invention, polyester fiber is more suitably used in respect of profitability, flexibility, reinforcement, and a modulus.

[0069] Although the hose concerning this invention consists of the inner tubes, reinforcement layers, and outer tubes which used the thermoplastic-elastomer constituent of this invention for either [at least] the inner tube or the outer tube like the above-mentioned, a glue line may be further included between reinforcement layers if needed.

[0070]

[Example] It cannot be overemphasized that it is not what limits this invention to the following examples hereafter although this invention is explained still more concretely according to an example and the example of a comparison. The assessment approach used in the following examples is as follows.

It was fully kneaded by kneading by the 2 shaft kneading nature 2 shaft kneading extruder, the structure where a thermoplastic copoly ester elastomer was a matrix and acrylic rubber was a domain was taken by it, and the matrix and the thermoplastic copoly ester elastomer took the structure where were O and acrylic rubber was a domain about what was taken over in the shape of a strand, and made x that by which a 2 shaft kneading object is not taken over in the shape of a strand.

The hose was incurvated, the other end was turned in the direction of an end of a hose, and was pressed [the end of a hose bending force hose was fixed,], and the load load (kgf) which joins the hose other end when the bend radii of a hose are set to 60mm was measured.

Impact pressure test JIS Carrying out based on K6379, a trial oil is JIS. It is 120 degrees C of oil temperatures using the straight mineral oil equivalent to two sorts specified to K2213 (turbine oil).

Maximum-pressure 27.5MPa It is maximum-pressure 27.5MPa in 30 degrees C of oil temperatures after repeating a square wave 50,000 times and adding it. The square wave was repeated 500 times, the above process (120 degrees C and 30 degrees C) was repeated by turns, and the count (10,000 times) until a hose breaks was measured.

[0071] Generally adjustment of the adjustment thermoplasticity copoly ester elastomer of examples 1-5 and the example 1 of a comparison - 5 thermoplasticity copoly ester elastomer is known, for example, can be compounded by the approach of a publication etc. to JP,49-31558,B. As a raw material, dimethyl terephthalate, 1,4-butanediol, and the poly tetrapod MECHIRAREN glycol (PTMG) are used, tetra--n-butyl titanate is used as a catalyst, and temperature was raised at 250 degrees C in 100 minutes, stirring them. It decompressed gradually after that, it was made 0.1mmHg(s) in 10 minutes, and the polycondensation was performed. After making it react under reduced pressure for 120 minutes, it extruded underwater. Furthermore, it extruded and pelletized by the pelletizer for rubber. obtained thermoplastic copoly ester elastomer 1- 6 and 8 A hard segment A terephthalic acid / 1,4-butanediol copolymer, Soft segments are a terephthalic acid / tetramethylene glycol copolymer. The thermoplastic copoly ester elastomer 7 A hard segment A terephthalic acid / 1,4-butanediol copolymer, Soft segments are a terephthalic acid / ethylene glycol copolymer. Moreover, adjustment of the mole ratio of the polyol

residue of a hard segment, and the polyol residue of a soft segment It carries out by changing molecular weight and amounts, such as an amount of 1,4-butanediol, and PTMG, and the molecular weight of the obtained thermoplastic copoly ester elastomer and the mole ratio of polyol residue are shown in the following table 1.

[0072]

[A table 1]

表1

	分子量	ポリオール残基モル比 (ハードセグメント： ソフトセグメント)
熱可塑性コポリエステルエラストマー1	26000	1 : 1. 2
熱可塑性コポリエステルエラストマー2	26000	1 : 1. 5
熱可塑性コポリエステルエラストマー3	26000	1 : 1. 7
熱可塑性コポリエステルエラストマー4	26000	1 : 2. 0
熱可塑性コポリエステルエラストマー5	26000	1 : 3. 5
熱可塑性コポリエステルエラストマー6	26000	1 : 4. 0
熱可塑性コポリエステルエラストマー7	26000	1 : 1. 7
熱可塑性コポリエステルエラストマー8	13000	1 : 1. 5

[0073] With next, the loadings (weight section) shown in the following table 2 The thermoplastic copoly ester elastomers 1-8 obtained above, the thing which kneaded the rubber constituent excluding a cross linking agent and talc beforehand, and was made into the pellet, and a compatibilizer are thrown in from the first input port of the 2 shaft kneading extruder which set the shear rate as 1000sec-1 and set temperature as 230-degree C conditions. After carrying out melting kneading, carried out charge kneading of what mixed a cross linking agent and talc beforehand, the rubber constituent was made to construct a bridge dynamically, and distribution of a rubber phase was made to fix from the second input port. After an appropriate time, from the head of a 2 shaft kneading extruder, it extruded in the shape of a strand, and the obtained thermoplastic-elastomer constituent was pelletized by the pelletizer for resin, after cooling, water cooling and.

[0074] Next, the thermoplastic-elastomer constituent obtained above was used for the inner tube and the outer tube, and the hose with a bore [of 6mm] which consists of an inner tube (1mm in thickness), a polyester fiber reinforcement layer, and an outer tube (0.5mm in thickness), and an outer diameter of 9.5mm was produced. In addition, as adhesives, loading and Thailand Wright by Far East company 7411 moisture hardening mold urethane system adhesives were used (25 micrometers in each adhesives layer thickness). For assessment of the flexibility of the obtained hose, and endurance, measurement and the impact pressure test of the hose bending force were performed, and the result was shown in a table 2.

[0075]

[A table 2]

表 2

	実施例 1	比較例 1	実施例 2	実施例 3	実施例 4	比較例 2	実施例 5	比較例 3	比較例 4	比較例 5
熱可塑性樹脂組成物	222.5	222.5	222.5	222.5	222.5	222.5	222.5	593.32	37.08	
熱可塑性ポリエスチレンエラストマー 1										
熱可塑性ポリエスチレンエラストマー 2										
熱可塑性ポリエスチレンエラストマー 3										
熱可塑性ポリエスチレンエラストマー 4										
熱可塑性ポリエスチレンエラストマー 5										
熱可塑性ポリエスチレンエラストマー 6										
熱可塑性ポリエスチレンエラストマー 7										
熱可塑性ポリエスチレンエラストマー 8										
相溶化剤	11.12	11.12	11.12	11.12	11.12	11.12	11.12	11.12	11.12	222.5
ゴム組成物										
アクリルゴム	100	100	100	100	100	100	100	100	100	100
FEFカーボンブラック	40	40	40	40	40	40	40	40	40	40
ステアリン酸	5	5	5	5	5	5	5	5	5	5
ヒンダードフェノール系老化防止剤	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33
架橋剤	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
タルク	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
ゴム/樹脂重量比	39.3/60.7	39.3/60.7	39.3/60.7	39.3/60.7	39.3/60.7	39.3/60.7	39.3/60.7	20/80	75.9/24.1	39.3/60.7
二軸混練性	○	○	○	○	○	○	○	○	×	○
ホース曲げ力 (kgf)	40	48	35	32	30	28	35	50	混練不可	35
衝撃圧力試験 (万回)	55	60	51	50	41	30	48	60	混練不可	5

[0076] Each component used for below in the example and the example of a comparison is shown.
 compatibilizer: -- bond first 7L and a cross linking agent [by Sumitomo Chemical Co., Ltd.];butane.
 tetracarboxylic acid acrylic rubber:monomer presentation -- the acrylic rubber FEF carbon black:C strike
 SO of 40 % of the weight of ethyl acrylates, 32 % of the weight of butyl acrylates, 19 % of the weight of
 methoxy ethyl acrylate, and 9 % of the weight of glycidyl ethyl acrylate, hindered phenol system
 antioxidant [by Tokai Carbon Co., Ltd.];IRUGA NOx 1010, and the Ciba-Geigy Japan make [0077]
 Since the thermoplastic copoly ester elastomer with the small amount of soft segments is used for the
 example 1 of a comparison, and the example 5 of a comparison as shown in the mole ratio of polyol
 residue, it turns out that the hose bending force becomes large and is inferior to flexibility. Since reverse
 has too many amounts of soft segments as for the example 2 of a comparison, the endurance in an
 impact pressure test will fall. The example 3 of a comparison will have too many amounts of resin, and
 flexibility and endurance will get worse. As for the example 4 of a comparison, reverse had too many

amounts of rubber, and a thermoplastic copoly ester elastomer could not take matrix structure, and was not able to knead it. As for each the constituent and hose which were used for examples 1-5 to it, the result with good kneading nature, flexibility, and endurance was obtained.

[0078]

[Effect of the Invention] By using the thermoplastic-elastomer constituent containing a specific thermoplastic copoly ester elastomer and the acrylic rubber which has an epoxy group as the inner tube and/or outer tube of a hose, if this invention is followed as explained above Since it excels in oilproof and cold resistance since specific acrylic rubber is used, and a rubber constituent is made to construct a bridge according to dynamic bridge formation, need a processing (vulcanization) process like a rubber hose, and do not carry out it, but the cutback of a manufacturing cost is possible. The hose which improved flexibility and endurance can be obtained by furthermore devising the polymerization structure of a thermoplastic copoly ester elastomer.

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.*** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] (i) at least a kind of thermoplastic copoly ester elastomer 10 - 70 % of the weight (however, a component (i) and 100 % of the weight of total quantities of (ii)) of rubber constituents containing the acrylic rubber containing 30 - 90 % of the weight of thermoplastics constituents, (ii) acrylic radical, and the epoxy group which are included is included. The high-melting crystalline-polymer hard segment in which said thermoplastic copoly ester elastomer (i) contains crystalline aromatic polyester, While making the low-melt point point polymer soft segment containing the aromatic series and/or the aliphatic series polyester unit containing an aliphatic series polyether into a main constituent The thermoplastic-elastomer constituent with which the mole ratio of the polyol residue of said hard segment and the polyol residue of said soft segment is characterized by or more 1:1.5 being less than 4.0.

[Claim 2] The thermoplastic-elastomer constituent according to claim 1 currently distributed by the matrix phase of the thermoplastics constituent for which the bridge is constructed over the rubber component of said rubber constituent, and which contains said thermoplastic copoly ester elastomer as a dispersed phase.

[Claim 3] The hose which comes to constitute the inner tube and/or outer tube of a hose which consist of an inner tube, a reinforcement layer, and an outer tube at least from a thermoplastic-elastomer constituent according to claim 1 or 2.

[Translation done.]